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POPULATION PROJECTIONS BY FIVE-YEAR AGE GROUPS FOR THE CITY OF BOSTON IN 1985.

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POPULATION PROJECTIONS BY FIVE-YEAR AGE GROUPS FOR THE CITY OF BOSTON IN 1985:

A Background for Discussing Stability, Growth, The Incipient Boom in Household Formations, And the Impact of Alternative Housing Policies

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Boston Redevelopment Authority
Research Department

October 1978

Research Report no. 75

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This report by the Research Department of the Boston Redevelopment Authority describes the development of alternative population projections by age group for Boston in 1985. The cohort component method was used to develop these projections. In this method, the impact of the probable births, deaths and migration between 1970 and 1985 on the size and age structure of the City's population as it moves through time is determined from recent trends of these factors in Boston. Specifically, five-year, age-specific rates of mortality, net migration, and fertility are applied to the various cohorts as they move through the appropriate age groups.

This report presents six alternative projections of Boston's population based on differing migration and fertility assumptions. The range of the total projected City population from 661,838 to 616,966 is relatively small because these alternatives are representative of what may actually happen. They do not attempt to represent targets in any sense, nor the bounds or outer limits of possible growth or decline.

Results

The six sets of projections by age groups which result from the assumptions described later in this report are presented in Table 1, with percent distributions in Table 2. The total projected populations range from 616,966 to 661,838 persons, with a difference of some 45,000 persons. For comparative purposes, the actual populations in 1960 and in 1970 are also presented. Series A produces projections which show losses of between 1,000 (-.003) and 24,000 (-.0468) when compared to the 1970 population figure. Series B yields projections which vary between a 1,000 person (-.005) loss and a 21,000 person (+.032) gain.

The differences between the several projections can be specified as to the contributions of differential migration and differential fertility. The two migration assumptions (A following the 1950-60 and 1960-70 trends; B being a modification of these trends) produce a difference of 22,500 persons between Series A and Series B 1985 projections. Therefore, the differing net migration assumptions account for half of the range between the Series A-Low and Series B-High. This can be determined by comparing Series A-High with Series B-High, etc. Of these some 22,000 persons, 18,000 are 15 years and older while 4,000 are under 15 years of age.

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Table 1

PROJECTIONS OF THE POPULATION OF BOSTON BY AGE GROUPS, 1985, AND ACTUAL 1960 AND 1970 POPULATIONS

			1985					
			Series A			Series B		
			Fertility			Fertility		
Age Groups	1960 Population	1970 Population	High	Medium	Low	High	Medium	Low
Total	697,197	641,071	639,023	625,544	616,966	661,838	647,763	638,807
0-4	66,019	49,927	58,753	50,006	44,432	61,571	52,404	46,563
5-9	54,770	51,707	45,842	41,110	38,106	47,521	42,613	39,498
10-14	50,780	51,058		34,132			34,213	
15-19	51,917	61,064		48,930			49,111	
20-24	54,480	77,118		81,911			82,619	
25-29	45,859	47,925		83,622			86,717	
30-34	43,032	31,454		51,350			56,282	
35-39	42,707	29,108		45,767			51,309	
40-44	41,482	31,627		30,673			31,844	
45-49	42,283	32,806		22,213			25,780	
50-54	41,487	32,667		21,103			21,577	
55-59	39,998	32,096		22,832			23,125	
60-64	36,798	30,755		22,352			22,182	
65-69	32,241	26,891		20,896			20,675	
70-74	24,673	22,578		18,104			17,504	
75-79	15,983	15,933		14,778			14,229	
80-84	7,983	9,805		10,084			9,772	
85 yrs. & over	4,705	6,552		5,681			5,807	

Table 2

PERCENT DISTRIBUTION OF POPULATION IN 1960 AND 1970 BY AGE GROUPS AND OF THE PROJECTIONS OF POPULATION FOR BOSTON, 1985

			1985					
	Population		Series A			Series B		
			Fertility			Fertility		
Age Groups	1960	1970	High	Medium	Low	High	Medium	Low
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
0-4 years	9.5	7.8	9.2	8.0	7.2	9.3	8.1	7.3
5-9	7.9	8.1	7.2	6.6	6.2	7.2	6.6	6.2
10-14	7.3	8.0	5.3	5.5	5.5	5.2	5.3	5.4
15-19	7.4	9.5	7.7	7.8	7.9	7.4	7.6	7.7
20-24	7.8	12.0	12.8	13.1	13.3	12.5	12.8	12.9
25-29	6.6	7.5	13.1	13.4	13.6	13.1	13.4	13.6
30-34	6.2	4.9	8.0	8.2	8.3	8.5	8.7	8.8
35-39	6.1	4.5	7.2	7.3	7.4	7.8	7.9	8.0
40-44	5.9	4.9	4.8	4.9	5.0	4.8	4.9	5.0
45-49	6.1	5.1	3.5	3.6	3.6	3.9	4.0	4.0
50-54	6.0	5.1	3.3	3.4	3.4	3.3	3.3	3.4
55-59	5.7	5.0	3.6	3.6	3.7	3.5	3.6	3.6
60-64	5.3	4.8	3.5	3.6	3.6	3.4	3.4	3.5
65-69	4.6	4.2	3.3	3.3	3.4	3.1	3.2	3.2
70-74	3.5	3.5	2.8	2.9	2.9	2.6	2.7	2.7
75-79	2.3	2.5	2.3	2.4	2.4	2.1	2.2	2.2
80-84	1.1	1.5	1.6	1.6	1.6	1.5	1.5	1.5
85 and over	0.7	1.0	0.9	0.9	0.9	0.9	0.9	0.9

Differential fertility rates implied in the High and Low Series account for the other half of the 45,000 person range. Therefore, of the 26,600 difference in persons under 15 years between the highest and lowest projections, 15 percent (4,000 persons) is attributable to fertility while 85 percent results from varying fertility levels.

The several projection series imply slightly differing age distributions as well. Series A, because it assumes that past trends will continue, produces a relatively higher concentration of persons in the age groups under 25 years and over 65 years than does Series B. Series B assumes that Boston is sufficiently attractive to the intermediate ages that the net outflow, the excess of leavers over stayers and newcomers, for this group is lower. Specifically, the migration patterns in B indicate approximately 19,000 additional persons in the ages 25 to 64 years.

Although the shift may appear slight, it implies an increasing tendency for working age persons to live in the City. This would result in lower dependency ratios, both in terms of age dependency (the ratio of persons under 15 years and over 65 years to the remainder of the population) and economic dependency (the ratio of not economically active persons to those who are economically active).

Comparison of Cohort Component Projections with Housing Projections.

These alternative projections mesh well with the number of housing units anticipated to exist in 1985 by Rolf Goetze and Bonnie Heudorfer and the household size projected by the Research Department of the BRA in 1974.

The number of housing units available to Bostonians in 1985 has been estimated at between 236,900 and 247,900 units, compared to 232,448 units in 1970. The projected number of persons per dwelling unit is 2.7, a slight drop from 2.76 in 1970. This small decline is part of a long-term trend that results from a greater tendency for people to live alone and for families to have fewer children.[1] These assumptions about housing units and household size yield a range of 1985 population between 639,630 and 669,330.

The population projections in this report center around the lower end of this range. Indeed, they imply smaller household size, between 2.6 and 2.7 persons, assuming that the trend toward living alone for a greater portion of one's life, as young adults and at older ages, may produce smaller households. This coincides with current estimates of household size (2.67 persons) in Boston. However, this must be weighed against the effect of an incipient boom in household formations, expected to peak in the early

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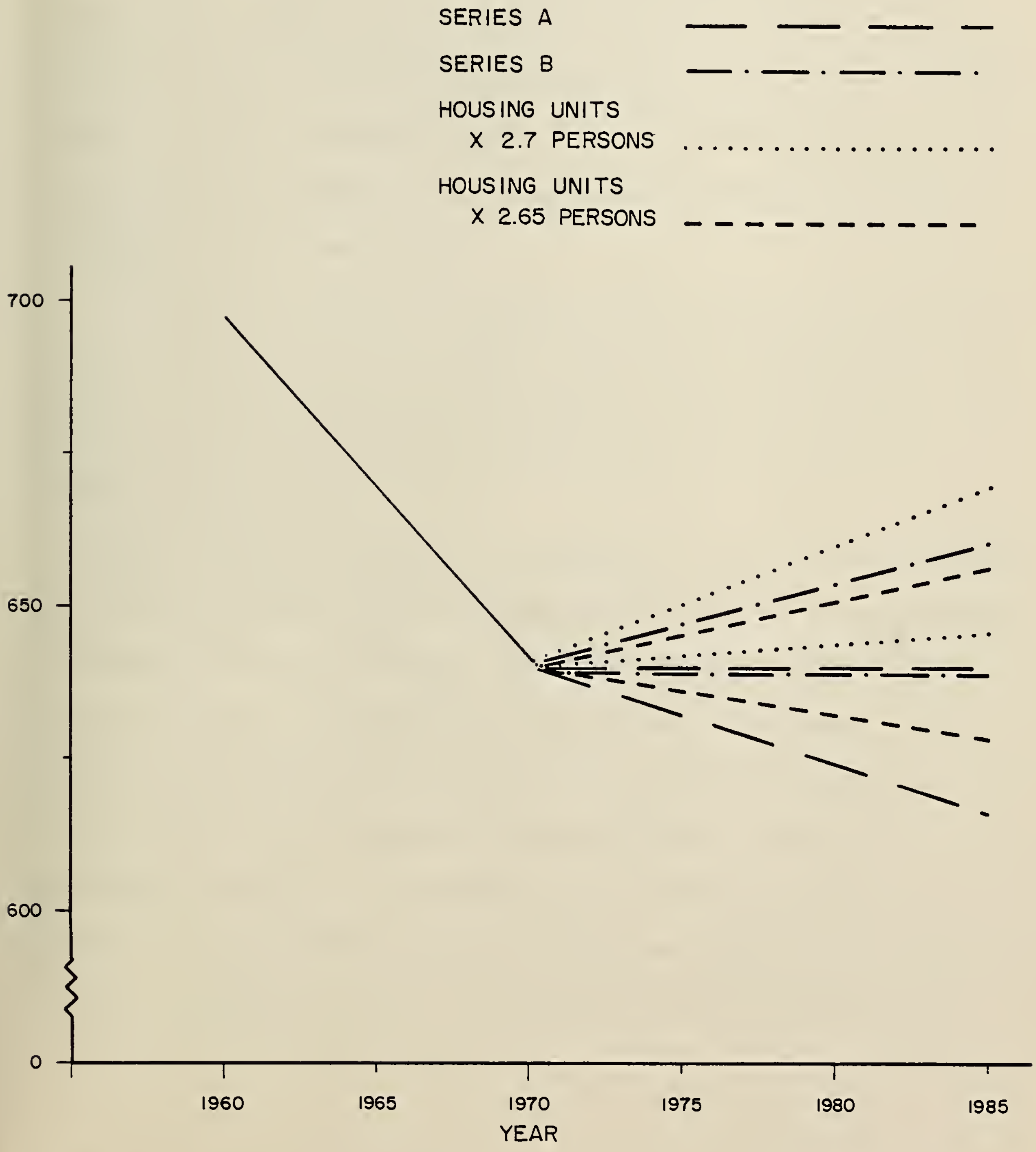
[1] For a general statement about this trend, see Frances E. Kobrin, "The Fall of Household Size and the Rise of the Primary Individual in the United States", Demography, February 1976, pp. 127-138.

CHART I. RANGES OF 1985 POPULATION PROJECTIONS FROM COHORT COMPONENT AND HOUSING UNIT METHODS



1980s, and a concomitant housing squeeze which may well encourage larger households to live in the City. These two basic trends in household size and formation will unavoidably lead to some competition for housing and some displacement of households, since the housing stock of the City for 1985 is fixed within a certain possible range. The number and types of housing units in Boston will undoubtedly influence the numbers and types of City residents.

If planned additional new housing units are constructed by 1985, it is possible that Boston's population would grow to 662,000. If not, the population may stabilize at close to current numbers.

The occupants of these new units might reasonably be expected to be young to middle-aged adults of some affluence, either single or coupled with few children. Planning for these additional units along with the upgrading of conventional apartment housing could provide the kind of housing that would attract upper middle class young adults into the City, perhaps as long-term residents. If, instead, much of the conventional apartment stock becomes part of the pool of subsidized housing, a different occupant profile, in terms of age and income, would

result. Similarly, the preservation of 1 to 4 unit housing stock is important in retaining middle-class households.

It seems most realistic to expect Boston's population to grow one to three percent between 1970 and 1985, given the constraint of housing units available. However, what the characteristics of that population will be are unclear. With the expected doubling of household formations between 1970 and 1980, there will be competition between young and old, haves and have-nots for existing housing. Therefore, current policies are important for the explicit and implicit incentives they provide to different kinds of people to make Boston their home.

Assumptions

The assumptions underlying the report offer three alternative courses of future fertility following national trends forecast by the U.S. Census Bureau. They also offer two different sets of migration assumptions, Series A and Series B, with differing configurations of population age groups resulting.

In Series A, the trend in the net migration patterns by age groups observed in the 1950s and 1960s is assumed to continue through 1985. Therefore, during the years between 1970

and 1985, Boston is expected to gain heavily through inmigration of young persons moving to the City to enter higher education and to seek jobs. At the same time, the City will continue to lose persons in the other adult age groups, except the most elderly, albeit at a more moderate rate than before 1970. The migration patterns for children up to age 14 are also assumed to follow the trends established in the two previous decades. Therefore, the loss of pre-school and school-age children is expected to continue, but at a slower pace.

Series B is predicated upon a modification of recent migration trends. The net inmigration of young persons is comparable to Series A. However, the decline in net outmigration at other ages is assumed to occur by specified amounts between 5 percent and 25 percent, such that most age-specific rates of net outmigration are slightly lower than in Series A.

The three fertility series are derived from high, medium, and low fertility paths developed for the United States by the U.S. Bureau of the Census.[2] The ratios of Boston and Massachusetts fertility to U.S. fertility in the recent past are extrapolated to yield appropriate local fertility rates in the event that the nation might follow any of the three projected courses of

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[2] U.S. Bureau of the Census, Current Population Reports, "Projections of the Population of the United States: 1975 to 2050", Series P-25, No. 601, Table A-8.

fertility. Since Boston's and Massachusetts' fertility have been lower than that for the United States in the recent past, it is presumed that the difference between national and local rates will diminish if national fertility rates are lower.

Death rates are assumed to remain constant at 1973 levels[3] throughout the projection period. This assumption is conservative in that mortality levels may decline over the twelve-year period. However, such a decline would probably be slight unless there is a major medical breakthrough with respect to a leading cause of death. (The national length of life expectancy increased by one year between 1969 and 1973.)

Projection Methodology

These cohort survival method projections were computed in several steps. First, females aged 0-29 in 1970 were projected by 5-year groups to ages 15-44 years, the childbearing age group, in 1985 by application of female age-specific survival and net migration rates (Tables 3 and 4). Males aged 15-44 were projected by applying 1970 sex ratios, the ratios of males to females for five-year age groups (Table 3), to the 1985 females.

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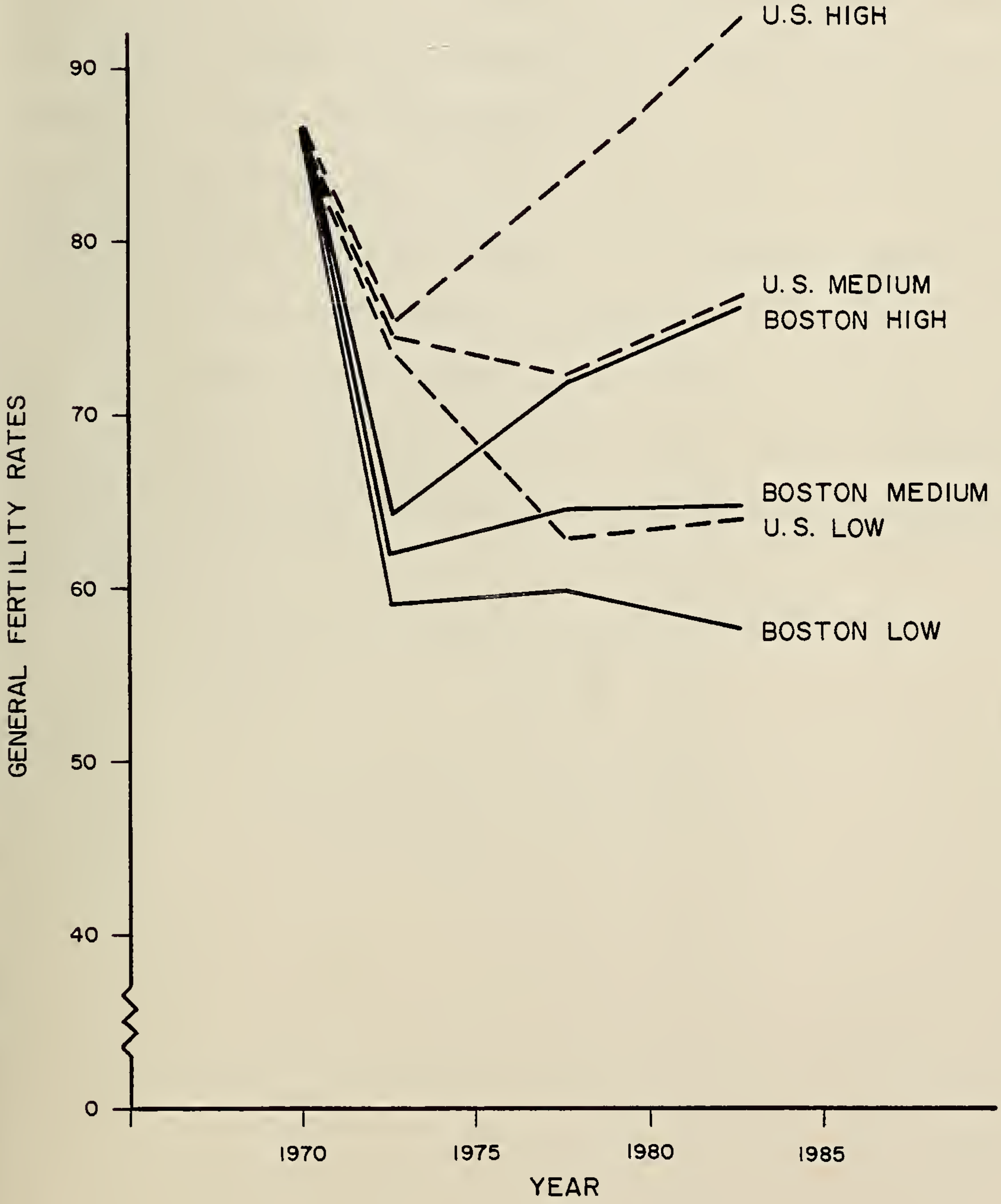
[3] U.S. Bureau of the Census, Population Estimates and Projections, "Projections of the Population of the United States, 1977 to 2050", Series P-25, No. 704, Table Bl.

CHART 2. GRAPHS OF CURRENT & FUTURE GENERAL FERTILITY RATES FOR BOSTON AND THE UNITED STATES



Children born between 1970 and 1975 were known. Those born in 1976 through 1985 were estimated by the successive applications of the three series of general fertility rates to the average number of women aged 15-44 in the two five-year periods 1975-1980 and 1980-1985 (Table 6). The births were then subjected to combined five-year age-specific survival and net migration rate schedules (Table 6) to obtain the projected population 0-4, 5-9, and 10-14 years of age in 1985 (Table 7).

The population 45 years old and over was obtained by applying age-specific survival and net migration rates for the 15-year period to the population aged 30 years and older in 1970 (Tables 3 and 4).

SURVIVAL RATES FOR THE PRE 1970 AND 1970-1985 PERIOD AND 1970 SEX RATIO BY AGE GROUPS

			10-Year Survival Rates[1]		5-Year Survival Rates[1]	1970 Sex Ratio[2]
1970	1980	1985	Pre-1970	Post 1970		
		0-4				
	0-4	5-9				
	5-9	10-14				1.032
0-4	10-14	15-19	.9955*	.9965*	.9981*	.863
5-9	15-19	20-24	.9962*	.9969*	.9971*	.757
10-14	20-24	25-29	.9940*	.9952*	.9967*	.973
15-19	25-29	30-34	.9930*	.9937*	.9960*	.975
20-24	30-34	35-39	.9910*	.9925*	.9944*	.955
25-29	35-39	40-44	.9870*	.9901*	.9913*	.904
30-34	40-44	45-59	.9810*	.9851*		
				.9789**	.9807**	
35-39	45-49	50-54		.9764*		
			.9613**	.9677**	.9702**	
40-44	50-54	55-59	.9415**	.9504**	.9550**	
45-49	55-59	60-64	.9120**	.9253**	.9315**	
50-54	60-64	65-69	.8694**	.8874**	.8995**	
55-59	65-59	70-74	.8102**	.8342**	.8554**	
60-64	70-74	75-79	.7294**	.7645**	.7930**	
65-69	75-79	80-84	.6270**	.6706**	.7043**	
70-74	80-84	85+	.5014**	.5486**	.5065**	
75+	85+		.2296**	.3458**		

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* Female

** Both sexes

[1] Source of survivorship rates for 1980-85 are estimates for 1976 from U.S. Department of Commerce, Bureau of the Census, Population Estimates and Projections, P.-25 "Projections of the Population of the United States: 1977-2050", Table B-1.

[2] The sex ratio is the ratio of males to females.

SERIES A AND B

1970	1980	1985	1950-60 Net Migration Rates	1960-70 Net Migration Rates	Ten-Year Migration Rates A Trended Net Migration Rates	Ten-Year Migration Rates B Migration Rates	Five-Year Migration Rates A	Five-Year Migration Rates B
		0-4					-.113**	-.106**
	0-4	5-9					-.102**	-.101**
	5-9	10-14					-.086**	-.092**
0-4	10-14	15-19	-.271*	-.221*	-.180*	-.177	+.312*	+.312*
5-9	15-19	20-24	-.049*	+.223*	+.268*	+.279	+.453*	+.453*
10-14	20-24	25-29	+.143*	+.757*	+.906*	+.908*	-.108*	-.076*
15-19	25-29	30-34	-.206*	-.089*	+.025*	+.025	-.167*	-.144*
20-24	30-34	35-39	-.378*	-.412*	-.395*	-.330*	-.107*	-.096*
						-.309**		
25-29	35-39	40-44	-.344*	-.306*	-.272*	-.245*	-.072*	-.071*
						-.230**	-.092**	-.083**
30-34	40-44	45-49	-.273*	-.207*	-.157*	-.155*		
			-.289**	-.242**	-.203**	-.182**	-.077**	-.070**
35-39	45-49	50-54	-.230*	-.174*	-.132*	-.130*		
			-.242**	-.201**	-.167**	-.151**	-.073**	-.070**
40-44	50-54	55-59	-.178*					
			-.189**	-.164**	-.142**	-.131**	-.073**	-.073**
45-49	55-59	60-64	-.133**	-.168**	-.150**	-.151**	-.070**	-.076**
50-54	60-64	65-69	-.152**	-.147**	-.142**	-.140**	-.066**	-.078**
55-59	65-69	70-74	-.107**	-.170**	-.138**	-.162**	-.083**	-.088**
60-64	70-74	75-79	-.094**	-.159**	-.126**	-.151**	-.092**	-.100**
65-69	75-79	80-84	-.199**	-.212**	-.206**	-.201**	.000**	-.037**
70-74	80-84	85+	-.263**	-.207**	-.163**	-.197**	-.082**	-.025**
75+	85+		-.153**	+.005**	+.163**	+.050**		

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* Female

** Both Sexes

			1970	1975		1980		1985		1985	
1970	1980	1985	Population	Female Population		Population		Female Population		Males and Females	
				A	B	A	B	A	B	A	B
		0-4									
	0-4	5-9									
	5-9	10-14									
0-4	10-14	15-19	24,545*			20,056*	20,130*	26,264	26,361	48,930	49,111
5-9	15-19	20-24	25,456*			32,178*	32,457*	46,620	47,023	81,911	82,619
10-14	20-24	25-29	25,133*	36,404	36,428	47,674*	47,724*	42,383	43,952	83,622	86,711
15-19	25-29	30-34	32,782*	32,060	33,086	31,338*	33,390*	26,000	28,467	51,350	56,282
20-24	30-34	35-39	43,904*	35,084	36,550	26,363*	29,195*	23,410	26,245	45,767	51,309
25-29	35-39	40-44	24,295*	20,904	21,228	17,512*	18,161*	16,110	16,725	30,673	31,844
30-34	40-44	45-49	15,926*	14,576	14,592	13,226*	13,257*				25,780
			31,454**			24,540**	28,266**			22,213	
35-39	45-49	50-54	14,887*	13,752	13,766	12,617*	12,646*				21,577
			29,108**			23,464**	23,914**			21,103	
40-44	50-54	55-59	16,611*								23,125
			31,627**			25,790**	26,121**			22,832	
45-49	55-59	60-64	32,806**			25,802**	25,772**			23,352	22,182
50-54	60-64	65-69	32,667**			24,872**	24,930**			20,896	20,675
55-59	65-69	70-74	32,096**			23,080**	22,437**			18,104	17,504
60-64	70-74	75-79	30,755**			20,550**	19,962**			14,778	14,229
65-69	75-79	80-84	26,891**			14,318**	14,408**			10,084	9,772
70-74	80-84	85+	22,578**			10,367**	11,185**			5,681	5,807
75+	85+		32,290**			12,986**	11,724**				

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* Female

** Both sexes

General Fertility Rates[1]

	1970	1975	1980	1985
High		64.0	71.7	75.9
Medium	73.8	61.7	64.3	64.6
Low		58.7	59.6	57.4

Projected Average Annual Births

	1970-75		1975-80		1980-85	
	A	B	A	B	A	B
High	48,189	48,649	57,552	59,123	66,238	68,871
Medium	46,458	46,901	51,612	53,021	56,376	58,617
Low	44,199	44,620	47,840	49,145	50,093	52,084
Actual	46,883					

5-Year Survival Migration Rates

	1960	1970	1970-1985	
			A	B
Births to 0-4	-.154	-.132	-.113	-.106
0-4 to 5-9	-.156	-.126	-.102	-.101
5-9 to 10-14	-.153	-.115	-.086	-.092

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[1] Source: U.S. Dept. of Commerce, Bureau of the Census, Population Estimates and Projections, P-25, No. 601, Table A-8.

BY AGE GROUP, 1985

Age and Fertility Series	1975		1980		1985	
	A	B	A	B	A	B
0-4 years						
High		[1]	51,049	52,860	58,753	61,571
Medium	41,585	41,913	45,780	47,401	50,006	52,404
Low			42,434	43,936	44,432	46,563
5-9 years						
High				[1]	45,842	47,521
Medium			37,343	37,680	41,110	42,613
Low					38,106	39,498
10-14 years						
High						[1]
Medium					34,132	34,213
Low						
Population aged 0-14 years						
High					137,388	142,665
Medium					124,109	128,699
Low					116,543	119,811

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[1] Projections are based on actual rather than estimated births between 1970 and 1975.

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~~by Five-Year Age~~
AUTHOR Groups in Boston 1985

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